Saving Regret: Self-assessed Life-cycle Saving Behavior in the U.S. and Singapore

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Abstract

Based on the belief that many people have under-saved and that the reason for under-saving is procrastination, paternalistic nudging to foster saving is often advocated by policy researchers. However, there is little empirical evidence that on hindsight individuals would wish to have saved more than they did, which is an implication of under-saving due to procrastination. To fill this empirical gap, we fielded surveys in the RAND American Life Panel and in the Singapore Life Panel. We asked persons ages 60 to 74 whether, if they were given the chance to do it over again, they would have saved differently earlier in their lives. If they wished to have saved more, we say they have "saving regret." We also fielded a psychometric battery designed to classify people according to their tendency to procrastinate. We found both in the United States and in the Singapore data that about half the population expressed saving regret with the proportion being higher in the U.S. The likelihood of expressing regret was uncorrelated with our measures of procrastination: That is, individuals who affirm statements that plainly indicate a tendency to put off difficult tasks are no more likely to express saving regret than individuals who do not have that tendency. We also asked respondents whether, over their lifetimes, they had experienced unexpected events or shocks that harmed their economic situation, such as unemployment. Substantially higher fractions of the U.S. sample experienced such shocks. That experience explained the greater frequency of saving regret in the U.S.

Citation

Authors' acknowledgements

Introduction

A number of research papers advocate paternalistic nudging to foster saving, especially to increase economic resources in old age (Thaler 1994;Thaler and Shefrin, 1981; Laibson 1997, 1998; Laibson *et al*., 1998; Thaler and Sunstein 2003, 2009; Lewis 2008; Chetty *et al*., 2014). A justification for these interventions is the belief that many people have under-saved and that the reason for under-saving is that often people procrastinate, particularly about saving. An implication is that on hindsight, the preferred choice of such persons would be to have saved more than they actually did. However, there is little empirical evidence on the saving behavior that individuals would have chosen on hindsight.

To fill this empirical gap, we fielded two surveys in the RAND American Life Panel (ALP). We asked persons ages 60 to 74 whether, if they were given the chance to do it over again, they would have saved differently earlier in their lives. If they would have wanted to have saved more, we say they have "saving regret."

In May 2018, we fielded a similar survey to 60-74 year old participants of the Singapore Life Panel (SLP)[1], which is modelled on the ALP Financial Crisis Surveys. Viewed in international context, Singapore is similar to the U.S. in encouraging self-reliance, but it has a smaller safety net and the institutions surrounding economic preparation for retirement are very different. In particular, Singapore mandates a total contribution rate of 37% of earnings (employee and employer combined) for most

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workers into funds managed by the Central Provident Fund. These funds finance consumption in retirement and health care both pre- and post-retirement. They can also be used for financing the purchase of a home. There are very few defined benefit (DB) pension plans, no Social Security, limited public health insurance, and no unemployment insurance.

We use the data from the ALP and the SLP to compare saving regret in the U.S. with that in Singapore and to shed light on the mechanisms leading to saving regret and how these may interact with the policy environment. Because of the high level of mandated saving in Singapore, procrastination would appear to be irrelevant, possibly bringing the role of financial risks over the lifecycle into focus. This raises the questions of the roles of uncertainty and the individual's ability to manage unexpected financial shocks in shaping retirement saving outcomes and how do these differ in Singapore and the U.S.

Background about Singapore

For many years Singapore has experienced strong economic growth: GDP per capita was $12,400 in 1979 and $58,800 in 2019 (both in 2010 USD). It experienced similarly strong growth in education. In 2015, for example, only 25% of 65 to 69 year olds in Singapore had some post-secondary education, while 45% of 50 to 54 year olds did. This implies that in 15 years the proportion of the population attending at least some college increased 20-percentage points.

The Singapore's economy is strongly market based but with significant policy interventions at several key points. The most important intervention for saving behavior is the Central Provident Fund (CPF) operated by the Singapore Government. While

there is some variation by age and cohort, for most workers 37% of earnings is mandated to be contributed to the CPF, about half paid by the employee and half by the employer. These contributions are on a pre-tax basis (tax advantaged). They are paid into three accounts. First, about half the mandated contribution is deposited into the Ordinary Account. This account may be used for investment and for purchasing housing and servicing a mortgage, even during the working life. Unspent funds from this account may be used to support retirement spending. Second, about one-fourth of the total contribution is paid into the Special Account, which is savings for retirement. These funds cannot be withdrawn before age 55. Thus about 9% of earnings are dedicated solely to retirement, slightly less than what is paid into U.S. Social Security for retirement (about 10%). Both the Special Account and the Ordinary Account are defined contribution (DC) pension schemes, so that, unlike the U.S. Social Security system, they lack progressivity. Third, the remaining one-fourth of contributions are paid into the MediSave account, used for health care insurance and spending on health care during working life and in retirement. The MediSave account can also be used to fund family members' health care insurance and health care spending. At age 55, a fourth account, the Retirement Account, is established using monies from the Special Account and the Ordinary Account. There is a required minimum that must be deposited into the Retirement Account. At age 65 or at least by age 70, a mandated minimum amount of the Retirement Account must be converted to an annuity.

The savings in the Ordinary and Special accounts (about 27% of earnings) would appear to be adequate to finance retirement, but apparently much of the Ordinary Account savings have been used to finance the purchase of housing. Housing is quite

expensive in Singapore, resulting in a high concentration of wealth in housing: Our SLP sample shows that Singaporeans 50 to 70 years old in 2018 had median housing wealth of about $377,000 (converted to 2018 U.S. dollars using purchasing power parity)[2] and median total wealth of $613,000. To put these values into perspective, we note that median income of Singapore couples shortly before retirement (ages 50 to 55) was about $47,000.

All persons can buy subsidized health care insurance that aims to cover costs in public hospitals and clinics, which perhaps are of lower quality. Lower-income persons can be subsidized further. Higher-income persons can buy additional integrated plans; 68% of the population purchases such plans, which cover private hospitals and better wards. The insurance purchase can be made from the MediSave account.

Most assets in CPF accounts earn interest above market rates. CPF account holders have some ability to invest in stocks and other limited vehicles, but mostly the funds are interest bearing. Retirement is financed by the CPF account and any private savings. Private pensions are rare.

The "Retirement Age" is currently 62, having been increased from age 60 in 1993. Employers may not dismiss employees on grounds of age before the retirement age of age 62. The retirement age is to be raised in steps to 65 beginning in 2022. Employees work on contracts, which often have end dates at specific ages, particularly age 62 and 65.

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[2] The conversion is to multiply the Singapore dollar by 0.94. According to the actual exchange rate the Singapore dollar is worth about 0.73 U.S. dollar.

Singapore has a policy to encourage later retirement, the Retirement and Re-employment Act (RRA). The RRA was introduced in 2007, but not enacted until 2012. The employers of workers whose contracts ended between the ages of 62 and 65 were encouraged to extend their contracts either in one shot or in a series of one-year contracts to the Re-employment Age, which was specified in the RRA act to be age 65. The new contract may be subject to negotiation, resulting in a change in duties or a wage reduction within limits. The employer has an incentive to "re-employ" the worker because of penalties that could be imposed should an unwillingness to re-employ not be justified. Satisfactory reasons for not re-employing would include health conditions or poor job performance.

The Re-Employment Age was increased to age 67 in 2017, and is scheduled to increase to age 70 in steps beginning in 2022. Likely as a result of the discussion surrounding the RRA, labor force participation at older ages increased sharply even before the formal enactment in 2012: In 2005 the labor force participation rate of men 60 to 64 was 52.5% and of women was 21.3%; in 2019, these rates were 76.7% for men and 50.7% for women.

There is no public unemployment insurance in Singapore. The stated aim of the government is to help with re-employment. But some long-term unemployment exists (Hurd and Rohwedder 2018).

Data

The RAND American Life Panel

The ALP is a standing panel of about 6,000 individuals 18 and older who are invited to take a survey over the internet from time to time. Individuals are recruited into the panel in a way to enhance population representation. The panel has been active in its current form since 2006, so that data from hundreds of surveys are available and can be linked to individuals, greatly expanding the types of analyses that can be performed on data from any particular wave. See Pollard and Baird (2017) for details on sample recruitment, response rates, retention, and weighting.

We designed ALP survey 455, fielded in August-December 2016 to respondents 60 or older. We obtained 1,728 completed interviews (72.3% response rate). The questionnaire began with sociodemographic and economic characteristics, a psychometric battery for personal characteristics, including procrastination, and a set of questions about the respondents' assessments of their income and living standards. To elicit individuals' hindsight assessment of their saving behavior, we prompted them to look back to when they were around 45 years old and to say whether they wished they had saved more, about the same, or less earlier in life if given the chance to re-do their saving and spending. Specifically, we asked

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…please think back to when you were around 45 years old.
Suppose you could re-do your spending and saving from then to
now, would you…

1 Save more over the years?

2 Save about the same over the years?
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3 Save less over the years?
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We call the choice of 1 "saving regret."

We conducted a design experiment in ALP. For a random 50% of respondents we modified response 1 to:

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1 Spend less and save more over the years?
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to remind respondents that saving more would require a reduction in spending. We call this the "framed" version. Framing resulted in a reduction of regret of about 7-percentage points. Our objective in the framing was to reduce or even avoid "cheap talk."

For those who expressed regret we followed up with a list of categories of spending items such as housing, food, or clothing and asked which of them could have been reduced. We included a response of

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No way we could have cut spending. We could not have saved more
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in which case we recoded the respondent as not expressing saving regret. The objective of the follow-up questions was to reduce "cheap talk" further; that is, to remind, perhaps more forcefully, that saving more would require spending less.

We fielded a second survey from December 2017 to February 2018 in which we asked again about saving regret. We used the framed version only, and used the follow-up about categories of spending that could be reduced. In most of the results presented in this paper, we pool the responses from the two ALP surveys and account for the effect on the standard errors of a repeated observation on the overlap cases (2,111 individuals out of the 2,290 individuals in the second wave). Based on our experience from the first survey, we modified several of the questions in the second wave: So for

some of the analyses, we only use observations from the second wave and from the overlap cases in the first wave. For these analyses over this modestly reduced data set we have an identical survey design in the ALP and the SLP.

To measure an individual-level lack of will-power to follow through on personal commitments or a tendency to procrastinate, we asked a series of questions in wave 1 about an individual's self-perception of his or her ability to accomplish difficult tasks and about whether in past or ongoing actions the person had or does procrastinate. We call these "psychometric" variables. They were derived from the General Procrastination Scale (GPS) described and validated by Tuckman (1991). We asked respondents to evaluate themselves along several dimensions, such as a self-assessment of their general and financial planning behavior and motivations. A first set of five questions used the following format:

Do you agree or disagree with the following statements?

The first question was

People should do what they like today rather than putting it off until tomorrow.

1 Strongly disagree

2 Disagree

3 Neither agree or disagree

4 Agree

5 Strongly agree

This question was followed with four additional attitudinal questions. See Table 3 (Panel A) for the complete list.

The second set asks the respondent whether he or she behaves in a particular manner such as this question, which directly assesses procrastination:

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How often do you…

put things off you should do but aren't really interested
in?

1 Never

2 Sometime

3 Most of the time

4 Always
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We use responses to seven questions of this type in this paper. See Table 3 (Panel B) for a listing. In total, we use 12 psychometric variables from the ALP. These same 12 were also asked in the SLP survey. We anticipated that they would be strongly related to an expression of saving regret.

An alternative explanation to procrastination for saving regret is shocks that may have occurred earlier in life and had an important impact on the respondent's financial situation. In the ALP survey we asked about negative shocks in the following way:

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Sometimes people have negative surprises earlier in life
that cause their finances to turn out worse than expected. Did
any of the following happen to you? Please check all that apply.
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We listed 11 negative shocks, such as unemployment or a large health expense. A similar question was posed about positive shocks. We listed eight positive shocks, such as earned more than expected or received an inheritance. The list of shocks was the same in ALP Wave 2 and SLP, but it was somewhat different in ALP Wave 1, so

that when comparing the frequency of shocks or the saving regret associated with shocks between the ALP and the SLP, we will confine the sample to those who were in ALP wave 2. For the overlap cases, however, we use their report of saving regret from both waves along with their report of shocks from Wave 2.[3]

Taking both ALP waves together, we have 2,618 respondents in our age range, 60 to 74. Of them 2111 were in both waves (overlap cases), 328 in Wave 1 but not in Wave 2, and 179 in Wave 2 but not in Wave 1.

The Singapore Life Panel

The Singapore Life Panel (SLP) is a monthly, internet-based survey representative of the Singapore population ages 50 to 70 (and their spouses) when first recruited in 2016. The SLP was modeled in many ways after the ALP Financial Crisis Surveys, a series of monthly interviews that Hurd and Rohwedder launched in the ALP in May 2009 (Hurd and Rohwedder 2015). The SLP has a core of regular monthly questions, some additional regular quarterly content, plus rotating modules. In January it obtains a complete assessment of income during the preceding year and a complete balance sheet of assets. The SLP has consistently high response rates, obtaining about 8,000 interviews every month (Vaithianathan *et al.* 2018).

In May 2018, we fielded a survey in the SLP on saving regret. We aimed to obtain data elicited in exactly the same way as in Wave 2 of the ALP survey. We asked about saving regret in the framed version, as in Wave 2. We asked the same

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[3] Because of observation error or reporting error, the Wave 2 response contains additional information, but the standard error must be adjusted for a second report from the same respondent.

psychometrics questions, the same measures of planning horizon, financial literacy and probability numeracy, and about the same shocks. We obtained 4,559 responses in our age range, 60 to 74.

Results

Table 1 shows the percent of respondents expressing regret in the ALP and in the SLP, both before and after revision. Both populations reduced regret when asked what types of spending could have been reduced, the ALP by about 12 percentage points and the SLP by 8 percentage points. Fewer Singaporeans than Americans wished they had saved more: Very few in either country would have saved less.

Table 2 shows the variation in saving regret as a function of demographic, social, and economic characteristics. In both countries there is little difference between men and women.

In the U.S. there is a monotonic age gradient: Age is associated with less regret, and the difference between the oldest and the youngest age band is statistically significant. That pattern is not found in Singapore.

The population distribution by marital status is quite different in Singapore: Divorce is 11 percentage points lower and "never married" five percentage points higher than in the U.S. Among those in the U.S., higher proportions of those who are separated, divorced, or widowed express saving regret. This is in line with the well-known economic status of those groups: Particularly, divorced or separated women have fewer economic resources. This pattern by marital status is not evident in Singapore.

Because the educational levels in the two countries are quite different, we divided educational attainment into terciles. Given the large number of U.S. respondents who have completed high school but no further education, we used randomization to achieve the equal allocations.[4] In the U.S., those in the middle educational tercile expressed regret with the greatest frequency. In Singapore, there is no education gradient.

In both countries, those in the highest wealth quartile are the least likely to express saving regret, with the difference between the highest wealth quartile and the others being greater in the ALP than in the SLP.[5] There is little variation in saving regret by income in either country. In Singapore, those in fair or poor self-assessed health are more likely to express regret. This pattern is also observed in the U.S., but the difference is not statistically significant.

Based on the extensive literature that explains under-saving using behavioral explanations, we expected to see systematic and large variation in saving regret as a function of self-rated characteristics for procrastination, lack of self-control, and present bias. In Table 3 we show how saving regret varies by such measures of personal traits.

The first five traits are meant to measure self-confidence and a focus on the present. Because of very few responses in some of the categories, we collapsed the five response categories (strongly disagree, disagree, neither agree nor disagree, agree, strongly agree) into three categories (strongly disagree and disagree, neither

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[4] In the ALP the lowest tercile is mostly composed of those who completed high school, whereas in the SLP, it is mostly composed of those with a primary education only.

[5] The large number of missing values in the ALP are due to wealth data being collected in a different wave of the ALP. It is only in the overlap cases that we have a wealth measure.

agree nor disagree, agree and strongly agree). Of interest, first, is the distribution of the populations across the response categories. The SLP responses are split evenly between the three categories, whereas the ALP responses are strongly shifted toward "disagree." The other notable difference is the response to the statement *"For the sake of my health, I stay away from unhealthy foods or behaviors that I might enjoy."* Some 35% of ALP respondents agreed with that statement compared with 64% of SLP respondents. The distribution of responses to the other three categories are similar across the two populations.

When we consider the relationship between the responses to the characteristics and the expressing of saving regret, we find little correlation. For each of the five characteristics in Panel A, we estimated the mean expression of regret over each of the three response categories, and we make comparisons between the reference category, the category with the most observations, and the other two categories, for a total of 10 comparisons. In the ALP, there were no significant differences in saving regret. In the SLP, there were seven significant differences in two-sided tests at the 5% level, but just three of them had the expected sign, that is an increase in regret for an increase in a measure of a focus on the present. For example, 48% of those agreeing with "*People should do what they like today rather than putting it off until tomorrow*" expressed saving regret compared with 41% of those disagreeing and 40% of those neither agreeing nor disagreeing. That is, people with a greater focus on the present were somewhat more likely to express regret. However, in the other four significant comparisons, the sign of the difference did not align with expectations. For example, among those who agreed with the statement "*For the sake of my health, I stay away from unhealthy foods or*

behaviors that I might enjoy," 49% expressed saving regret compared with 40% among those who neither agreed nor disagreed with the statement.

In Panel B, we show the estimates across seven statements about self-perceived behavior. These seven may have more validity than the five in Panel A because they ask about what individuals have actually done rather than self-perception. Several would seem to apply directly to an inability to save such as "*How often do you give up a task when it gets difficult?*" In both the ALP and the SLP, we conducted comparisons between the reference category and the other three categories for each of the seven behaviors for a total of 21 comparisons. In the ALP there were four significant differences, but three were not of the anticipated sign. For example, among those who responded "most of the time" to the question "*How often do you settle for mediocre results when you could do better*?," 35% expressed saving regret compared with 53% among those who responded "sometimes." In the SLP, there were three significant comparisons, but just one had the anticipated sign: The rate of regret among those who always try several tasks but don't complete many was 15 percentage points higher than the reference group ("sometimes"). However, that group comprised just 1.4 percent of the population.

Table 4 shows the fraction expressing regret as a function of several attributes that perhaps could be called skills. In both the ALP and the SLP large fractions have missing values because the questions about these attributes were not on all the surveys: the data on those attributes had to be retrieved from other ALP and SLP surveys which were not taken by some of our respondents. The most frequent responses to planning horizon were "next few years" or "5-10 years." In the ALP there is

a monotonic reduction in regret as the planning horizon increases, although no horizons are significant relative to the reference group. In the SLP, there is little variation in regret except at the long horizon of 10 years or more. In the ALP, regret declines monotonically as financial literacy increases, and the differences are large and significant. By contrast, in the SLP there is no consistent variation in regret as a function of financial literacy. Probability numeracy is a skill that ought to help people make better financial decisions, and it is associated with saving regret: in both the ALP and SLP those who had more correct answers on questions designed to test probability numeracy were less likely to express saving regret.

Table 5 shows the frequency of negative and positive shocks in the ALP and SLP, ordered from most frequent to least in the SLP, and the likelihood of expressing regret. The overall level of negative shocks is much higher in the ALP: 69% reported that they had such a shock that impacted their financial position compared with 46% in the SLP. Four shocks are related to the labor market. Their frequencies are higher in the ALP and their effects on saving regret are much larger. In the ALP, the frequency of saving regret among those who did not report a negative shock was 0.421 (see Table 7, Panel B). Among those who experienced an unemployment shock (a spell "that cause their finances to turn out worse than expected"), the proportion who stated regret was 0.621, a difference in the frequency of 0.20. In Singapore, among those who did not experience a negative shock the frequency of expressing regret was 0.401. Among those who experienced an unemployment shock, the frequency of expressing regret was 0.542, an increase of 0.14. The other labor market shocks, "health limited work," "retired too early," and "earnings less than expected," are stated more frequently in the

ALP. Each also causes higher proportions of respondents in the ALP than in the SLP to express saving regret. Other shocks more common in the ALP than in the SLP include giving financial help to relatives, having unexpectedly high college costs, having a death in the family, and having a divorce or separation. The impact of such shocks on saving regret is substantial in the ALP, but negligible in the SLP. The frequency of a health care spending shock is about the same in both surveys, but the consequences for expressing regret are much greater in the ALP: an increase of 0.244 versus 0.097.

A larger proportion of ALP respondents reported having a positive shock, and the shocks had a greater impact on saving regret. In the ALP, those who had any positive shock expressed regret 6 percentage points less often than the average, but a positive shock had essentially no effect on regret in the SLP. In both surveys, having good investments or a good business resulted in significant reductions in expressing regret, but relatively few SLP respondents gave such a report.

Table 6 shows the distribution of negative shocks and the associated likelihood of regret. In the ALP, 31% of the respondents had no shocks; in the SLP, 54% had none. Among those who did not have a shock the likelihood of regret was almost the same, 0.421 compared with 0.401. Thus, a first explanation for the difference in the level of regret between the U.S. and Singapore is that many more in the U.S. had one or more negative shocks. The difference in shock prevalence is also seen at the upper tail of the distribution: 24% of the ALP respondents reported three or more shocks compared with just 10% in the SLP. Furthermore, the consequences of several shocks for saving regret are greater in the ALP: The likelihood of regret increases with the

number of shocks, reaching 0.76 for five or more shocks, whereas the likelihood is approximately flat at 0.50 for any number of shocks in the SLP.

Table 7, Panel A, shows the joint distribution of any positive or negative shock. The likelihood of either type of shock is higher in the ALP. In the ALP, there is no correlation between negative or positive shocks. For example, the likelihood of a positive shock given a negative shock is 0.515 versus an unconditional probability of 0.519. But in the SLP, the correlation is positive: The likelihood of a positive shock given a negative shock is 0.29 versus an unconditional probability of 0.24.

Panel B shows the likelihood of expressing regret. Reflecting the differences in the consequences of a shock, the variation is much greater in the ALP than in the SLP. The likelihood of regret is 0.39 among those who experienced a positive shock but not a negative shock; this is 30 percentage points less than the likelihood among those who experienced a negative shock but not a positive. In the SLP this difference is just 0.11. The panel exhibits an odd result: In the SLP, those who experienced a positive shock express saving regret slightly more often than those who do not experience such a shock. Upon investigation of the details, we found that what we intended to be positive shocks were often the consequences of a negative shock. For example, among those who worked more than expected, which *cet. par.* would lead to greater lifetime resources and possibly reduce saving regret, 61% experienced a negative shock compared with 43% among those who did not work more than expected. The most common negative shock was "earnings were less than expected," suggesting that working more than expected was a response to a shortfall in earnings. Similarly, receiving financial help from family, which would be an increase in lifetime resources,

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was associated with a greater likelihood of experiencing a negative shock, and the increase was greatest for "health limited work," followed by "large health expense." There is a similar although less pronounced tendency in the ALP: Among those who worked more than expected, 80% experienced a negative shock compared with 67% among those who did not work more than expected.

To check which of our main results are robust to controls for correlations among the explanatory variables, we estimated regressions of the probability of regret on the explanatory variables discussed in the preceding tables. The complete results are in the Appendix. Table 8 has excerpts from those regressions. We entered the psychometric variables linearly, scaled from 1 to 5 for the first group and from 1 to 4 for the second group. Our priors for the first group are that the coefficients on "*self-confident*" and "*avoid unhealthy food or behaviors*" would be negative and that the coefficient on "*do what you like today, don't put it off*," "*works best under pressure*," and "*life is about having fun*" would be positive. In the second group, our priors were that all would be positive. We estimated regressions that did and did not include wealth quartiles, but the differences are negligible.

In the ALP in group 1, two coefficients are statistically significant and in accord with our priors. The first, *self-confident*, has a negative coefficient; the second, *works best under pressure*, has a positive coefficient. The other coefficients are not significant and have a mix of signs with respect to conforming to priors. The coefficients that are significant in the ALP are not significant in the SLP, and those significant in the SLP are not significant in the ALP. Of the three that are significant in the SLP, only one, "Do what you like today…" has the anticipated sign.

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In the second ALP group, one coefficient is significant but it does not have the anticipated sign: Those who tend to settle for mediocre results report less regret. Ignoring significance levels, we find that three of the seven estimated coefficients have the anticipated sign. In the SLP, the one significant coefficient, "settle for mediocre results," has the opposite sign from that in the ALP.

As for the effect of any negative shock, our regression results that do not control for wealth quartile are similar to the results evident in the cross-tabs of Table 6. The effect of any positive shock in the ALP is somewhat attenuated but remains significant both statistically and in magnitude.

Discussion

Overall, we find saving regret is substantially lower in Singapore than in the U.S. This may be a result of long-term economic conditions in each nation. The Singapore economy has grown greatly for many years, possibly leading to a current financial position that is better than many had expected. By contrast, since 1973 the U.S. has had periods of a stagnating economy with periods of quite high unemployment, possibly leading to a current financial position that is worse than many expected. The Great Recession appears to be particularly relevant for this observation: Our U.S sample of 60 to 74 year olds would have been in prime saving years for retirement at the time of the downturn.

Although both economies are market-driven and place considerable weight on self-reliance, Singapore has an important forced saving mechanism, the CPF. While the U.S. Social Security system may be even more important for retirement saving than the CPF, particularly for low-income individuals because of the progressivity in its benefit

schedule, it does not force saving for health care or as a buffer for negative economic shocks.

Actual saving outcomes in the U.S. and Singapore are similar, but the components of saving differ substantially. According to the 2018 SLP survey, median wealth in our target population was $613,000, converted from Singapore dollars to 2018 U.S. dollars using purchasing power parity. Median values of the components of wealth were $377,000, housing; $116,000, CPF wealth; and $38,000, financial wealth. Median wealth in the U.S. in the 2016 HRS was $559,000. Median values of components were $120,000, housing; $260,000, Social Security wealth: and $59,000, financial wealth.[6] Although the median wealth values are similar, the heavy concentration of wealth in housing renders Singaporeans effectively poorer because they must finance nonhousing consumption out of much less wealth. At the same time, because health care can be paid from CPF savings, and because health care is so much cheaper in Singapore than in the U.S., Singaporeans are perhaps better able to self-finance their health care. While nearly all U.S. retired persons have Medicare, 8.6% of total spending by those 55 to 64 and 12.3% of total spending by those 65 to 74 was on out-of-pocket medical expenses.

Shocks appear to be quite important in both countries. Among SLP respondents, 46% had a negative shock that affected their financial position; among ALP respondents, 69% had one. The effect of shocks was not symmetric; very few reported they wished that they had saved less. Shocks did have a smaller impact on saving

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[6] The HRS total wealth does not include a wealth equivalent of DB pension entitlements, DC pension balances from prior jobs (just the current job), nor a wealth equivalent to a claim on Medicare benefits.

regret among SLP respondents, which is consistent with shocks for SLP respondents being less severe. Some institutional reasons may also contribute to shocks having less of an impact in Singapore. In 2017, Singapore spent just 4.4% of GDP on health care while the U.S. spent 17.9%. As a result, the forced contributions to saving in MediSave coupled with possibly some small co-pays could shield many Singaporeans from health care spending shocks.

College expenses may also cause greater shocks in the U.S. than in Singapore. Between 1989 and 2016, the cost of attending a four-year university in the U.S. doubled in real terms while median real wages barely increased.[7] In Singapore, tuition at the five autonomous universities increased by 14% in real terms between 2007 and 2016, but median wages increased by 23% in real terms. As a result, college education became more affordable in Singapore but less affordable in the U.S.

Another large difference between the U.S. and Singapore is the frequency of a death in the family (likely widowing but not specifically asked) and of divorce. Both are more frequent in the U.S., and the effects of each on saving regret is higher in the U.S. Labor market shocks are another difference between the countries: such shocks are more frequent in the U.S., and the effect on saving regret is greater.

We did not find that psychometric variables explain much of saving regret in either the U.S. or Singapore. We conclude that a battery of measures of procrastination, or a tendency not to tackle difficult tasks as measured by 12 indicators, were of little use in distinguishing persons who would have liked to have saved more from those who

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[7] https://www.forbes.com/sites/camilomaldonado/2018/07/24/price-of-college-increasing-almost-8-times-faster-than-wages/#30efd6b66c1d

were satisfied with their saving behavior. Our second conclusion is that to understand economic preparation for retirement we need to understand better the role of shocks. Part of that understanding is to learn more about individual expectations regarding lifetime shocks and their understanding of the consequences of shocks. An approach undertaken by government in Singapore is to force people to engage in buffer stock saving, but this is easier to do when an important sector, health care, is so much cheaper.

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Table 1: Prevalence of saving regret, before and after revision

Wish to have	ALP		SLP	
	Total		**Total**	
	before revision	after revision	before revision	after revision
…saved more	66.0	54.2	53.3	45.5
…about the same	32.5	44.3	42.4	50.1
…saved less	1.5	1.5	4.4	4.4
Total	100.0	100.0	100.0	100.0
N	2,618		4,559	

Note: In the SLP respondents were asked whether they would "Spend less and save more over the years?" which we call the framed version of the question. In the ALP a random half sample were asked the framed version; the other half were asked whether they would "Save more over the years?" which we call the unframed version. The ALP results combine both random subsamples.

Table 2: Saving regret by sociodemographic characteristics

	ALP					SLP				
			Saving Regret (After Revision)					Saving Regret (After Revision)		
	N	In percent	Mean	Std. Error	T-test	N	In percent	Mean	Std. Error	T-test
Total	2,618	100.0	0.542	0.015		4,558	100.0	0.455	0.007	
Female										
0	1,246	47.6	0.526	0.025	ref	2,247	49.3	0.465	0.011	ref
1	1,372	52.4	0.557	0.019	ns	2,311	50.7	0.446	0.010	ns
Age										
60-64	1,058	40.4	0.581	0.024	ref	2,137	46.9	0.467	0.011	ref
65-69	926	35.4	0.531	0.024	ns	1,514	33.2	0.444	0.013	ns
70-74	634	24.2	0.494	0.032	**	907	19.9	0.448	0.017	ns
Marital status										
Married	1,747	66.7	0.517	0.019	ref	3,542	77.7	0.454	0.008	ref
separated or divorced	505	19.3	0.625	0.030	***	364	8.0	0.481	0.026	ns
Widowed	242	9.2	0.617	0.048	*	227	5.0	0.463	0.033	ns
never married	120	4.6	0.426	0.068	ns	421	9.2	0.444	0.024	ns
Missing	4	0.2	0.000	0.000	***	4	0.1	0.250	0.217	
Education terciles										
Lowest	874	33.4	0.528	0.034	ref	1,520	33.3	0.447	0.013	ref
2	871	33.3	0.605	0.023	*	1,519	33.3	0.460	0.013	ns
Highest	873	33.3	0.494	0.017	ns	1,519	33.3	0.460	0.013	ns
Wealth quartiles										
Lowest	328	12.5	0.595	0.048	ref	1,150	25.2	0.463	0.015	ref
2	323	12.3	0.654	0.045	ns	1,129	24.8	0.469	0.015	ns
3	323	12.3	0.559	0.040	ns	1,133	24.9	0.495	0.015	ns
Highest	324	12.4	0.355	0.038	***	1,129	24.8	0.398	0.015	***
Missing	1,320	50.4	0.544	0.021	ns	17	0.4	0.294	0.111	ns
Income quartiles										
Lowest	670	25.6	0.507	0.034	ref	1,022	22.4	0.465	0.016	ref
2	688	26.3	0.595	0.031	*	1,020	22.4	0.441	0.016	ns
3	585	22.4	0.558	0.028	ns	1,038	22.8	0.486	0.016	ns
Highest	642	24.5	0.508	0.023	ns	986	21.6	0.440	0.016	ns
Missing	33	1.3	0.535	0.142	ns	492	10.8	0.433	0.022	ns
Fair or poor health										
0	2,029	77.5	0.533	0.017	ref	2,782	61.0	0.430	0.009	ref
1	589	22.5	0.576	0.034	ns	1,776	39.0	0.495	0.012	***
Fair or poor memory										
0	2,199	84.0	0.537	0.017	ref					
1	285	10.9	0.512	0.048	ns					
Missing	134	5.1	0.698	0.043	***					

Note: *** = p-value < 0.01; ** = p-value < 0.05; * = p-value < 0.10

Table 3: Saving regret by personality traits

	ALP					SLP				
			Saving Regret (After Revision)					Saving Regret (After Revision)		
	N	In percent	Mean	Std. Error	T-test	N	In percent	Mean	Std. Error	T-test
Panel A: Self-confidence and present focus										
Self-confident										
(Strongly)disagree	194	7.4	0.561	0.054	ns	268	5.9	0.500	0.031	ns
Neither	420	16.1	0.580	0.041	ns	1,363	29.9	0.422	0.013	***
(Strongly) agree	1,870	71.4	0.521	0.018	ref	2,918	64.0	0.467	0.009	ref
Missing	134	5.1	0.698	0.043	***	9	0.2	0.333	0.157	ns
Works best under pressure										
(Strongly)disagree	708	27.0	0.499	0.031	*	850	18.6	0.499	0.017	ns
Neither	985	37.6	0.524	0.025	ns	2,035	44.6	0.429	0.011	**
(Strongly) agree	791	30.2	0.577	0.028	ref	1,664	36.5	0.467	0.012	ref
Missing	134	5.1	0.698	0.043	**	9	0.2	0.222	0.139	ns
Do what you like today										
(Strongly)disagree	148	5.7	0.478	0.062	ns	252	5.5	0.405	0.031	**
Neither	423	16.2	0.503	0.039	ns	1,150	25.2	0.401	0.014	***
(Strongly) agree	1,913	73.1	0.545	0.018	ref	3,147	69.0	0.480	0.009	ref
Missing	134	5.1	0.698	0.043	***	9	0.2	0.222	0.139	ns
Life about having fun.										
(Strongly)disagree	1,365	52.1	0.535	0.021	ns	1,493	32.8	0.486	0.013	**
Neither	636	24.3	0.498	0.032	*	1,529	33.5	0.431	0.013	ns
(Strongly) agree	483	18.5	0.578	0.037	ref	1,522	33.4	0.449	0.013	ref
Missing	134	5.1	0.698	0.043	**	14	0.3	0.571	0.132	ns
Avoid unhealthy food or behaviors										
(Strongly)disagree	685	26.2	0.514	0.030	ns	318	7.0	0.412	0.028	**
Neither	888	33.9	0.566	0.028	ns	1,296	28.4	0.397	0.014	***
(Strongly) agree	912	34.8	0.518	0.026	ref	2,937	64.4	0.486	0.009	ref
Missing	134	5.1	0.698	0.043	***	7	0.2	0.429	0.187	ns

Note: *** = p-value < 0.01; ** = p-value < 0.05; * = p-value < 0.10

	ALP					SLP				
			Saving Regret (After Revision)					Saving Regret (After Revision)		
	N	**In percent**	**Mean**	**Std. Error**	**T-test**	**N**	**In percent**	**Mean**	**Std. Error**	**T-test**
Panel B: Procrastination and perseverance										
Put off things you should do										
Never	109	4.2	0.441	0.075	ns	419	9.2	0.489	0.024	ns
Sometimes	1,916	73.2	0.531	0.018	ref	2,838	62.3	0.451	0.009	ref
Most of the time	411	15.7	0.578	0.039	ns	1,069	23.5	0.459	0.015	ns
Always	48	1.8	0.489	0.119	ns	218	4.8	0.454	0.034	ns
Missing	134	5.1	0.698	0.043	***	14	0.3	0.143	0.094	**
Give up before starting										
Never	1,196	45.7	0.509	0.023	*	1,061	23.3	0.476	0.015	ns
Sometimes	1,166	44.6	0.565	0.023	ref	2,918	64.0	0.450	0.009	ref
Most of the time	109	4.2	0.469	0.090	ns	481	10.6	0.443	0.023	ns
Always	13	0.5	0.531	0.168	ns	75	1.6	0.493	0.058	ns
Missing	134	5.1	0.698	0.043	***	23	0.5	0.391	0.102	ns
Try several tasks, don't complete many										
Never	869	33.2	0.517	0.027	ns	1,362	29.9	0.485	0.014	***
Sometimes	1,322	50.5	0.568	0.020	ref	2,732	59.9	0.441	0.009	ref
Most of the time	235	9.0	0.414	0.052	***	383	8.4	0.444	0.025	ns
Always	58	2.2	0.511	0.152	ns	66	1.4	0.591	0.061	**
Missing	134	5.1	0.698	0.043	***	15	0.3	0.133	0.088	***
Settle for mediocre results										
Never	1,096	41.9	0.558	0.022	ns	1,081	23.7	0.448	0.015	ns
Sometimes	1,271	48.6	0.528	0.023	ref	2,890	63.4	0.454	0.009	ref
Most of the time	112	4.3	0.345	0.067	***	484	10.6	0.473	0.023	ns
Always	5	0.2	0.910	0.086	***	75	1.6	0.533	0.058	ns
Missing	134	5.1	0.698	0.043	***	28	0.6	0.393	0.092	ns
Put off things not good at										
Never	362	13.8	0.562	0.040	ns	614	13.5	0.453	0.020	ns
Sometimes	1,629	62.2	0.535	0.019	ref	2,949	64.7	0.447	0.009	ref
Most of the time	459	17.5	0.499	0.044	ns	798	17.5	0.482	0.018	*
Always	34	1.3	0.642	0.126	ns	175	3.8	0.503	0.038	ns
Missing	134	5.1	0.698	0.043	***	22	0.5	0.318	0.099	ns

Put off difficult things

	N	%				N	%			
Never	1,086	41.5	0.546	0.025	ns	1,084	23.8	0.484	0.015	**
Sometimes	1,204	46.0	0.527	0.022	ref	2,890	63.4	0.440	0.009	ref
Most of the time	175	6.7	0.490	0.069	ns	476	10.4	0.479	0.023	ns
Always	20	0.8	0.667	0.150	ns	89	2.0	0.528	0.053	*
Missing	134	5.1	0.698	0.043	***	19	0.4	0.263	0.101	ns

Lose motivation during tasks

	N	%				N	%			
Never	846	32.3	0.558	0.027	ns	1,197	26.3	0.477	0.014	*
Sometimes	1,525	58.2	0.534	0.020	ref	2,930	64.3	0.444	0.009	ref
Most of the time	100	3.8	0.323	0.071	***	358	7.9	0.480	0.026	ns
Always	14	0.5	0.585	0.160	ns	53	1.2	0.509	0.069	ns
Missing	134	5.1	0.698	0.043	***	20	0.4	0.300	0.102	ns

Note: *** = p-value < 0.01; ** = p-value < 0.05; * = p-value < 0.10

Table 4. Saving regret by financial planning horizon, financial literacy and numeracy

ALP			Saving Regret (After Revision)			SLP		Saving Regret (After Revision)		
	N	In percent	Mean	Std. Error	T-test	N	In percent	Mean	Std. Error	T-test
Financial Planning Horizon										
I don't plan	70	4.4	0.68	0.071	ns					
Next few months	234	14.7	0.648	0.034	ns	577	12.7	0.492	0.021	ns
Next year	155	9.7	0.64	0.04	ns	341	7.5	0.443	0.027	ns
Next few years	299	18.8	0.593	0.029	ref	1,352	29.7	0.471	0.014	ref
Next 5-10 years	260	16.3	0.565	0.029	ns	1,061	23.3	0.465	0.015	ns
Longer than 10 years	189	11.9	0.508	0.034	*	689	15.1	0.398	0.019	***
Missing	384	24.1	0.552	0.025	**	538	11.8	0.441	0.021	ns
Financial Literacy										
0 correct answers	69	4.3	0.747	0.068	***	352	7.7	0.426	0.026	ns
1 correct answer	132	8.3	0.737	0.045	***	590	12.9	0.463	0.021	ns
2 correct answers	268	16.9	0.687	0.03	***	1,316	28.9	0.467	0.014	ns
3 correct answers	452	28.4	0.556	0.02	ref	1,431	31.4	0.453	0.013	ref
Missing	669	42.1	0.517	0.02	ns	869	19.1	0.450	0.017	ns
Probability Numeracy										
0 or 1 correct answers	146	9.2	0.505	0.045	ns	728	16.0	0.521	0.019	ns
2 correct answers	272	17.1	0.659	0.03	**	580	12.7	0.495	0.021	ns
3 correct answers	491	30.9	0.581	0.021	ref	702	15.4	0.499	0.019	ref
4 correct answers	147	9.3	0.461	0.033	***	1,204	26.4	0.416	0.014	***
5 correct answers						447	9.8	0.333	0.022	***
Missing	534	33.6	0.607	0.024	ns	897	19.7	0.457	0.017	***

Note: *** = p-value < 0.01; ** = p-value < 0.05; * = p-value < 0.10

Table 5: Saving regret and negative/positive shocks

| | ALP | | | | | SLP | | | | |
| | N | In percent | Saving Regret (After Revision) | | | N | In percent | Saving Regret (After Revision) | | |
			mean	Std. Error	T-test			mean	Std. Error	T-test
Negative Shocks										
Health limited work	452	19.8	0.622	0.037	**	641	14.1	0.524	0.020	***
Earnings less than expected	353	15.5	0.672	0.035	***	565	12.4	0.566	0.021	***
Unemployment	415	18.1	0.621	0.031	**	515	11.3	0.542	0.022	***
Large health expense	233	10.2	0.665	0.043	***	478	10.5	0.498	0.023	**
Retired too early	301	13.2	0.643	0.050	**	377	8.3	0.599	0.025	***
Financial help to relatives	396	17.3	0.661	0.041	***	352	7.7	0.497	0.027	ns
Bad investment	242	10.6	0.673	0.043	***	317	7.0	0.492	0.028	ns
Large (non-health/educ) expense	177	7.8	0.642	0.043	**	217	4.8	0.525	0.034	**
College costs higher than expected	211	9.2	0.673	0.042	***	192	4.2	0.469	0.036	ns
Death in family	279	12.2	0.665	0.043	***	193	4.2	0.451	0.036	ns
Divorce/separation	443	19.4	0.634	0.032	***	69	1.5	0.435	0.060	ns
Other	23	1.0	0.682	0.103	ns	40	0.9	0.325	0.074	*
Any negative shock	1,582	69.1	0.608	0.020	***	2,084	45.9	0.520	0.011	***
Positive Shocks										
Spent less than expected	335	14.7	0.549	0.049	ns	762	16.7	0.503	0.018	***
Respondent worked longer than expected	400	17.5	0.533	0.038	ns	646	14.2	0.488	0.020	*
Received financial help from family	188	8.2	0.570	0.046	ns	502	11.0	0.512	0.022	***
Respondent salary/earnings more than expected	545	23.8	0.481	0.034	**	483	10.6	0.460	0.023	ns
Good investments/business	539	23.5	0.403	0.031	***	405	8.9	0.388	0.024	***
Spouse worked longer than expected	257	11.2	0.503	0.061	ns	288	6.3	0.500	0.029	ns
Spouse salary/earnings more than expected	372	16.3	0.487	0.045	ns	259	5.7	0.502	0.031	ns
Received an inheritance	530	23.2	0.467	0.032	***	148	3.3	0.432	0.041	ns
Other	16	0.7	0.659	0.137	ns	54	1.2	0.426	0.067	ns
Any positive shock	1,188	51.9	0.488	0.022	***	1,074	23.6	0.461	0.015	ns
All										
	2,290	100.0	0.550	0.017		4,558	100.0	0.455	0.007	

Note: *** = p-value < 0.01; ** = p-value < 0.05; * = p-value < 0.10

Table 6: Saving regret by number of negative shocks

	ALP					SLP				
	N	In percent	Saving Regret (After Revision)			N	In percent	Saving Regret (After Revision)		
			mean	Std. Error	T-test			mean	Std. Error	T-test
Number of Negative Shocks										
0	708	30.9	0.421	0.031	ref	2,461	54.0	0.401	0.010	ref
1	634	27.7	0.538	0.035	**	1,098	24.1	0.507	0.015	***
2	408	17.8	0.613	0.036	***	514	11.3	0.537	0.022	***
3	267	11.7	0.617	0.040	***	245	5.4	0.567	0.032	***
4	157	6.8	0.738	0.045	***	123	2.7	0.480	0.045	*
5 plus	111	4.9	0.763	0.051	***	104	2.3	0.500	0.049	**
Missing	5	0.2	1.000	0.000	***	13	0.3	0.462	0.138	ns
Total	2,290	100.0	0.550	0.017		4,558	100.0	0.455	0.007	

Note: *** = p-value < 0.01; ** = p-value < 0.05; * = p-value < 0.10

Table 7: Saving regret and the experience of at least one negative/positive shock

ALP

Panel A: Distribution of Population According to Whether Positive or Negative Shock Was Experienced (Weighted)

	negative		
positive	No	yes	total
No	14.59	33.49	48.08
Yes	16.34	35.57	51.92
total	30.94	69.06	100.00

Panel B: Mean Saving Regret According to Positive or Negative Shock (Weighted)

	negative		
positive	no	yes	total
No	0.460	0.687	0.618
Yes	0.387	0.535	0.488
total	0.421	0.608	0.550

SLP

Panel A: Distribution of Population According to Whether Positive or Negative Shock Was Experienced (Unweighted)

	negative		
positive	no	yes	total
no	43.71	32.68	76.39
yes	10.44	13.17	23.61
total	54.15	45.85	100.00

Panel B: Mean Saving Regret According to Positive or Negative Shock (Unweighted)

	negative		
positive	no	yes	total
no	0.398	0.528	0.453
yes	0.414	0.498	0.461
total	0.401	0.519	0.455

Table 8: Extracts from regressions — effect on probability of expressing saving regret

	ALP		SLP	
	Model 1	Model 2	Model 1	Model 2
Self-confidence and present focus (Scaled 1-5 from "Strongly Disagree" to "Strongly Agree")				
Self-confident	-0.0547***	-0.0469**	-0.00600	-0.00517
Works best under pressure	0.0459***	0.0467***	-0.00747	-0.00711
Do what you like today, don't put it off	0.0243	0.0215	0.0394***	0.0406***
Life is about having fun	0.000819	-0.000302	-0.0149*	-0.0150*
Avoid unhealthy food or behaviors	0.0103	0.00862	0.0471***	0.0474***
Procrastination and perseverance (Scaled 1-4 from "Never" to "Always")				
Put off things you should do	0.0333	0.0300	-0.0233*	-0.0203*
Give up before starting	0.0401	0.0443	0.00469	0.00369
Try several tasks, don't complete many	-0.00935	-0.00881	-0.0176	-0.0173
Settle for mediocre results	-0.0507*	-0.0498*	0.0234**	0.0228**
Put off things not good at	0.0174	0.0159	0.0180	0.0209*
Give up task when difficult	-0.0176	-0.0132	-0.0111	-0.0121
Lose motivation during tasks	-0.0374	-0.0390	-0.00654	-0.00902
Negative shock	0.186***	0.173***	0.112***	0.108***
Positive shock	-0.110***	-0.0941***	-0.00336	0.0105
Wealth included	N	Y	N	Y
Observations	2436	2436	4514	4514
R2	0.106	0.119	0.0365	0.0421
F-tests				
joint significance psychometric scales	$F_{(12, 1411)}$ = 2.22 Prob>F = 0.0093	$F_{(12, 1411)}$ = 1.96 Prob>F = 0.0242	$F_{(12, 4487)}$ = 4.99 Prob>F = 0.0000	$F_{(12, 4483)}$ = 5.18 Prob>F = 0.0000
joint significance full model	$F_{(28, 1411)}$ = 7.58 Prob>F = 0.0000	$F_{(32, 1411)}$ = 7.61 Prob>F = 0.000	$F_{(26, 4487)}$ = 6.53 Prob>F = 0.0000	$F_{(30, 4483)}$ = 6.56 Prob>F = 0.000

Note: *** = p-value < 0.01; ** = p-value < 0.05; * = p-value < 0.10